SEMESTER END EXAMINATION, MAY, 2024

Course Name: - B.Tech. (C.S.E. +C.E.) Semester: - II[nd]

Paper Name: - Fundamentals of Electronics Engineering Paper Code: - TES-205

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. Max Marks-70

समय– 3 घण्टे + 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सह लेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 3 mark. **All questions are compulsory.**
- Section B- Answer any **5 out of 7** given questions in maximum one hundred fifty (150) words. Each question carries **7 marks.**
- Section C- Answer any **2 out of 3** given questions in maximum three hundred (300) words. Each question carries **10 marks.**

निर्देश:

- प्रश्न पत्र में तीन खण्ड अ, ब, व स है। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ में प्रत्येक प्रश्न तीन अंक का है। **सभी प्रश्न अनिवार्य हैं।**
- खण्ड–ब में **सात प्रश्नों में से किन्हीं पाँच** प्रश्नो के उत्तर अधिकतम 150 शब्दो में दें। प्रत्येक प्रश्न सात अंक का है।
- खण्ड–स में **तीन प्रश्नों में से किन्हीं दो** प्रश्नो के उत्तर अधिकतम (250-300) शब्दो में दें। प्रत्येक प्रश्न **10** अंक का है।

Section – A (खण्ड–अ)

Objective Questions (वस्तुनिष्ठ प्रश्न)

1. Answer all the following questions. 5x3 =15

निम्नलिखित सभी प्रश्न अनिवार्य हैं।

i) **What is the primary advantage of using Gallium Arsenide (GaAs) over Silicon (Si) in certain applications?**

A) Lower cost
B) Higher electron mobility
C) Greater abundance
D) Easier fabrication

ii) **Which of the following materials is commonly used as an insulator in semiconductor devices?**

A) Silicon (Si)
B) Germanium (Ge)
C) Gallium Arsenide (GaAs)
D) Silicon Dioxide (SiO_2)

iii) **Which of the following is not a characteristic of a Zener diode?**

A) Operates in reverse breakdown region
B) Designed to have a specific breakdown voltage
C) Used primarily in rectifier circuits
D) Has a sharp breakdown voltage

iv) **Which of the following regions in a BJT is responsible for its amplification properties?**

A) Cut-off region
B) Saturation region
C) Active region
D) Breakdown region

v) **Which terminal of a BJT is typically used to control the device operation?**

A) Collector
B) Emitter
C) Base
D) Substrate

Section - B (खण्ड–ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

2. **Answer any five of the following questions in maximum 150 words.** 5x7=35
निम्नलिखित में से किन्ही पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।

i. Write down properties and applications of Silicon (Si) as a semiconductor material?
ii. What factors influence the electrical resistivity of a semiconductor material?
iii. Explain the principle of operation of a junction diode in reverse bias with its circuit diagram and VI characteristics?
iv. Describe the Clipper, clamper with its types in electronic circuits?
v. Explain the function of the base terminal in a BJT?
vi. What is primary advantage of the using a MOSFET over a JFET?
vii. What is reason behind manufacturer mostly prefer n-type Silicon semiconductor? Write down Einstein relationship between mobility and diffusion constant?

Section - C (खण्ड–स)
Descriptive Questions (विवरणात्मक प्रश्न)

3. **Answer any two of the following question in maximum 300 words.** 2x10=20
निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 300 शब्दों में दें।

i) a) What is base in binary number system? Draw and explain the truth table, symbols of AND, OR and NOT and draw its diode and transistor circuit?

b) A piece of silicon at room temperature is doped with $8x10^{16}/cm^3$ Concentration of boron atoms and $20x10^{15}/cm^3$ of phosphorous atoms.

(a) Find the hole & electron concentration in this material?

(b) Is the silicon p or n type?

ii) (a) Write down about Conduction Band, Valence Band, Energy band gap, Diffusion, Concentration gradient, Doping, Mobility, drift velocity, Depletion width and Potential barrier?

(b) Write down about a diode mechanism, draw and Draw forward and reverse Voltage-current characteristics and its applications? Also write diode equations?

iii) (a) Write down about Hall Effect and its applications? Define charge neutrality principle?

(b) What do you understand about semiconductor, explain advantage and disadvantage of semiconductor? Classify it's based on conductivity and energy band gap with suitable example?

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SEMESTER END EXAMINATION, MAY, 2024

Course Name: - B.Tech **Semester: - II**

Paper Name: - Basic Electrical Engineering **Paper Code: - TES 202**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

समय– 3 घण्टे + 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं साह लेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

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- Section A- Each question carries **3 mark. All questions are compulsory.**
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निर्देश:

- प्रश्न पत्र मे तीन खण्ड अ, ब, स है। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ मे प्रत्येक प्रश्न तीन अंक का है। **सभी प्रश्न अनिवार्य हैं।**
- खण्ड–ब मे **सात प्रश्नों में से** किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें। प्रत्येक प्रश्न **सात अंक** का है।
- खण्ड–स मे **तीन प्रश्नों में से** किन्हीं दो प्रश्नों के उत्तर अधिकतम (250-300) शब्दों में दें। प्रत्येक प्रश्न **10 अंक** का है।

Section – A (खण्ड–अ)

Objective Questions (वस्तुनिष्ठ प्रश्न)

1. Answer all the following questions. **5x3 =15**

निम्नलिखित सभी प्रश्न अनिवार्य हैं।

i) Mesh analysis employs the method of KVL

a. KVL
b. KCL
c. Both KVL and KCL
d. Neither KCL nor KVL

ii) Which of the following is a correct representation of peak value in an AC Circuit?

a. RMS value / Peak factor
b. RMS value × Form factor
c. RMS value / Form factor
d. RMS value × Peak factor

iii) Which of the following conditions are desired in the core of an electromagnet?

a. High permeability and High retentivity
b. Low permeability and High retentivity
c. High permeability and Low retentivity
d. Low permeability and Low retentivity

iv) The current drawn by the armature of DC motor is directly proportional to _____

a. Torque
b. Speed
c. The voltage across the terminals
d. Cannot be determined

v) Earthing switch is used for

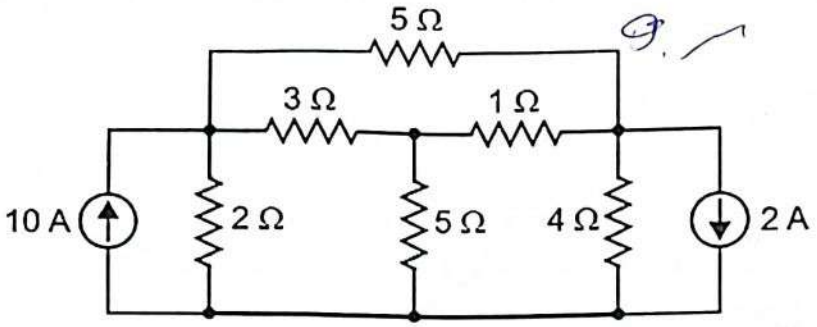
a. protection of equipment from ground faults
b. discharging residual energies

c. All of these
d. measuring of safety voltage

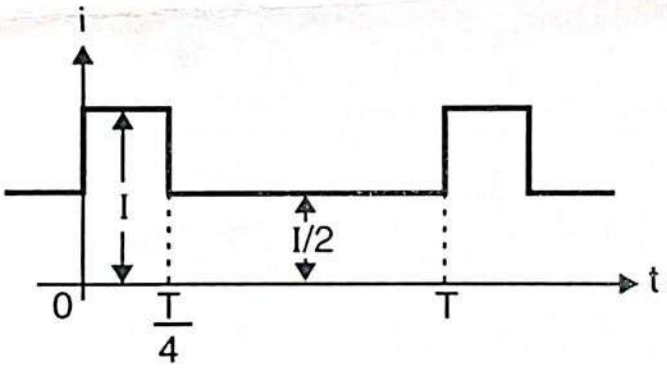
Section – B (खण्ड–ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum 150 words. **5x7=35**
निम्नलिखित में से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।

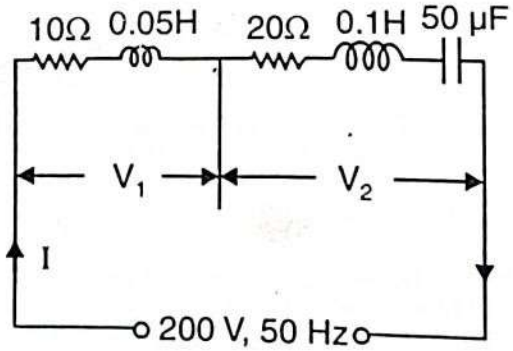
i. Use nodal analysis to find the currents in various resistors of the circuit shown in Fig.



ii. Determine (i) the average value and (ii) r.m.s. value of the current wave shown in Fig.



iii. In the circuit shown in figure (i), find the values of (i) the current I (ii) V_1 and V_2 and (iii) power factor. Draw the phasor diagram



iv. A series RLC circuit has R = 5 W, L = 0.2 H and C = 50 μF. The applied voltage is 200 V. Find, (i) resonant frequency (ii) Q-factor (iii) bandwidth (iv) upper and lower half-power frequencies (v) current at resonance (vi) current at half-power points (vii) voltage across inductance at resonance.

v. Differentiate the properties of diamagnetic, paramagnetic, and ferromagnetic substances. Also explain the B-H hysteresis curve point by point with proper figure.

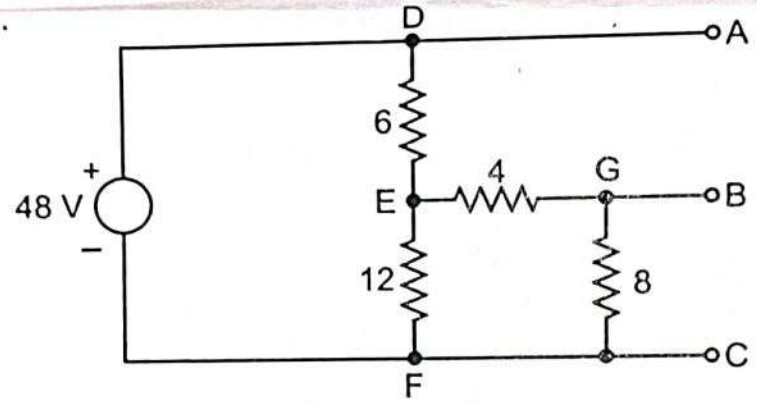
vi. Explain the equivalent circuit of a transformer in a condition when the secondary circuit is referred to as the primary. Also, explain the concept of leakage reactance and the Shunt branch.

vii. What is Circuit Breaker? Describe Earth leakage circuit's breakers (ELCB) in respect of working principle, operation, and advantages.

Section – C (खण्ड–स)
Descriptive Questions (विवरणात्मक प्रश्न)

3. Answer any two of the following question in maximum 300 words. **2x10=20**
निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 300 शब्दों में दें।

i) Calculate the values of V_{Th} and R_{Th} between terminals A and B in Fig. All resistances are in ohms.



ii) A 3-phase, 400 V, 50 Hz a.c. supply is feeding a 3-phase delta-connected load with each phase having a resistance of 25 W, an inductance of 0.15 H and a capacitor of 120 μF in series. Find line current, volt-amp, active power and reactive volt-amp.

iii) Explain the function of all parts of DC machine. Also, explain how a DC machine works and derive an equation for EMF in a DC machine.